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A sustainable perspective on urban freight transport: Factors affecting local authorities in the planning procedures

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Abstract

Freight transport has a minor role in transport planning procedures in most cities, although freight transport operations represent a substantial proportion of emissions. The focus in this research is the local authority perspective of sustainable urban freight transport and the aim is to contribute to the understanding of how freight transport affects the urban environment and how awareness and knowledge within the local authority effects the urban freight transport situation. The analysis is based on four studies: a literature study, a review of transport in three cities via in-depth interviews, a review of freight in four cities via in-depth interviews and finally a review of freight in all Swedish cities via a questionnaire survey. Three aspects are considered throughout the research: the sustainability concept, knowledge and awareness as well as barriers and drivers. The results confirm that knowledge and awareness in the area of urban freight transport is low, which generates a low level of interest in the subject and makes it hard to predict outcomes of certain actions. The implication for local authorities is that the issue of urban freight transport should gain a higher priority on the agenda.

Keywords: City logistics; freight transport planning; sustainable transport; urban freight transport

1. Introduction

This paper investigates sustainable freight transport in urban areas from the perspective of the local authorities. The main focus is the transportation process and how it is affected by decisions and prerequisites created by local authorities. It is the planning procedure of how to handle freight transport that occurs to, from and through the urban area from the local authority perspective that is investigated. City urban planning, political views, transport and infrastructure planning are important factors within local authorities that affect urban logistics, but the views of logisticians are rarely used in the planning process. The paper aims to map out an environmental perspective on urban freight transport to offer an understanding of the area, identifying important factors, and therefore laying the groundwork for further research. The overall research question is formulated as: How does freight transport knowledge and awareness in local (city) authorities affect sustainable freight actions in urban areas? Issues such as

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laws and regulations, infrastructure, finance, politics and culture, practical concerns, technology, and impacts are the factors upon which the results centre. Barriers and drivers within those groups of factors have been identified and are the main result from the research. Knowledge of those factors, barriers, and drivers could be used when working with sustainable urban freight issues, as well as describing and developing the area itself.

The main stakeholder studied and discussed are the local authority and their contacts with other stakeholders and actors (transport operators, retailers, trade organizations, and others that depend on freight transport). The focal point in the study is the transportation process and planning, not political science or urban planning – although those areas are closely related to the research area. The system studied is the freight transport operations carried out within the urban area (road bound) and how this system can be handled as efficiently as possible. However, private cars, public transport, or other types of personal transport are excluded, as well as infrastructure issues, vehicle types, and fuel discussions. How to optimize transport or certain specific detailed solutions to urban freight transport (e.g. urban consolidation centres or environmental zones) could occur as discussions, but are not integral aspects of this paper. Contributing factors to the urban environment (emissions, congestion etc.) from freight transport are discussed. The geographical limitations are urban areas (defined as the city centre areas together with suburban areas, and not countryside areas of municipalities). Suggestions and assumptions are based on the existing structure and optimized according to the physical urban plans of each city studied. Though the focus of the study is small and medium sized cities in Europe (based on Swedish municipalities as well as a number of northern European cities), the results should be useful for and applicable to other contexts. The number of inhabitants in small and medium sized cities in Europe varies from less than 10,000 up to around 1,000,000. Large Swedish cities represent approximately the size of medium-sized cities in Europe.

This paper starts with a discussion of the research method and a frame of reference for the research conducted. Thereafter the results from the studies are presented, both qualitative and quantitative. The paper closes with discussion of the findings and conclusions.

2. Method

Freight transport has a minor role in transport planning procedures in most cities although the transport operations of freight represent a substantial proportion of emissions. It is therefore interesting to note how this minor focus on freight has an impact on the freight transport situation in cities. Earlier studies in the area show that there is an existing problem, but those studies are mainly based on literature reviews and discussion groups and not actual case studies. In this research another approach has been chosen to confirm those theories, as well as develop them. Except from basic literature reviews, a number of surveys have been conducted to find empirical data on the perspectives of local authorities that plan urban freight transport. The paper is based on the analysis of four studies performed between the years 2005 and 2008. Both quantitative and qualitative methods have been used and action research has been an important part of the research process. Studies have been mainly performed within the EU-project BUSTRIP (Baltic Urban Sustainable Transport Implementing and Planning) where Sustainable Urban Transport Plans (SUTP) have been the focus.

The first study was an explorative introductory study based on literature reviews, statistics and document analysis, which is concluded mainly in the frame of reference. The second study was an explanatory study with a review of transport in three cities, where 30 in-depth interviews and direct observations were the main data collection methods. In the third study freight reviews of four cities were conducted through 30 in-depth interviews. The fourth and final study was a descriptive study based on a questionnaire survey reviewing freight in local authorities in all Swedish cities (there are 290 municipalities in Sweden and the response rate was 32.4%) where empirical data was collected. Three aspects of urban freight transport are considered within this paper: the sustainability concept; knowledge and awareness; and barriers and drivers.

3. Frame of Reference

Urban transport today is not sustainable. The situation is serious and requires action by governments, communities, and businesses (Low, 2003). Towns and cities in Europe constitute the living environment of 60% of the population and generate 85% of the gross domestic product in the EU (European Commission, 2007). Congestion, noise, emissions and traffic hazards contribute to the total urban experience. Transport activities are

increasing in urban areas, but they are also needed. Urban mobility is an important facilitator of growth and employment. Freight vehicles, as well as other heavy vehicles, are needed to service businesses and persons in the urban area. Private cars outnumber light and heavy goods vehicles according to several studies done in different cities (Schoemaker et al., 2006). But, goods movement represents between 20% and 30% of vehicle kilometres (Dablanc, 2007) and the significance of urban freight to unsustainable impacts compared to passenger transport is growing. Though freight transport operations in cities represent only 10% to 18% of vehicles it accounts for 40% of air pollution and noise emissions (European Commission, 2006). Furthermore, vehicles serving urban delivery operations are a well-established contributing factor to urban traffic congestion and increasing atmospheric pollution (Yannis et al., 2006). Nevertheless, an existing fact is that the classic focus on city planning does not fully include goods (Sjöstedt, 2007).

Many actions have been performed within city centres with the objective of reducing the negative environmental impacts of freight transport (e.g. EU projects within CIVITAS I & II etc. as well as nationally financed demonstration projects), but few have managed to fulfil a complete implementation after the external funding scheme ended. Some cities that are engaged in the issue, like London and Paris, have started to work with urban freight transport in different ways (see e.g. Browne et al., 2007a). However, urban transport solutions should be investigated and freight transport considered on a wider scale to cope with the unsustainable trends. In addition, few of the project evaluations or dissemination activities show and explain the things that went wrong with actions concerning urban freight transport. It is probable that the same mistakes are made time after time. To further work with urban freight transport and the sustainability issue related to this, there is a need for a comprehensive definition of sustainable urban freight. A useful definition has been developed by Behrends et al. (2008) as follows:

A Sustainable Urban Freight Transport system should fulfil the following objectives:

- To ensure the accessibility offered the transport system to all categories of freight transport;
- to reduce the air pollution, green house gas emissions, waste and noise to levels without negative impacts on the health of the citizens or nature;
- to improve the resource and energy efficiency and cost effectiveness of the transportation of goods, taking into account the external costs; and
- to contribute to the enhancement of the attractiveness and quality of the urban environment, by avoiding accidents, minimizing the use of land, without compromising the mobility of citizens.

It is important to note that the definition developed here should be seen as objectives. The definition is a pathway approach combined with an end state vision approach which offers a view of what a totally sustainable system looks like.

3.1. Pilot actions

Pilot action, is the term used to describe a project that is carried on for a limited period of time and is something not just done in theory, but in practice. The aim of a pilot action is, according to this discussion, to test if theory works in practice and the final goal is implemented in full scale or an understanding of how the action should, or should not, be performed. Implementation is fully integrating an action (i.e. a project that has no limitation in time as the pilot action) into a certain system. Implementation is not necessarily a success factor in itself. A successful pilot action does not need to be able to be implemented. This has a time frame to consider, since development in cities can make the measure unnecessary to implement. A successful pilot action is neither necessarily something that has to carry on after the project period ends. But, it is something that has provided a lesson to the one who has performed it or been integrated somehow in a continuation (it could be proof of that something is not possible to do or maybe something that gives a recommendation for future sustainable urban transport plans). Goals and objectives of the actions taken to reduce the freight transport in the urban area, or make it more efficient, need to be compatible with the city planning on a broader perspective. The BESTUFS (Best Urban Freight Solutions) project (Egger et al., 2001, p. 11) defines “Best practice” as planned or implemented only in private, public only, or public-private partnership strategies, measures or activities which have an essential contribution to urban goods transport and ideally lead to benefits for all actors involved. The following requirements are to be considered for identifying best practice:

- They have to fit to a defined theme or address a relevant problem with respect to the movement of goods in urban areas. They should be based on real experiences or analysis in studies.
- They should have considerable and measurable positive effects for all actors on relevant indicators of urban goods transport.

This definition excludes the possibility of also accepting negative effects as a sort of successful outcome. Negative effects are not best practice for the case itself, but, could be positive in a long-term perspective since it is then possible to learn from this as well and avoid those effects in other similar strategies, measures, or activities.

Factors and indicators are elements used to monitor and evaluate the performance of pilot actions. An indicator can be measured by someone for one project and then be compared with another one (i.e. emissions, load rate, congestion etc.). It is important that a common view on how the indicator is measured and compared is determined to get a reliable result of the comparison and evaluation. Factors are drivers or barriers to the success of a pilot action or implementation. A factor can, for example, be of economic, logistics, or political character (laws, regulations, incentives, etc.).

During the research period a number of pilot actions have been studied through literature in the forms of project reports, evaluations, and discussions with project managers (e.g. within the frames of CIVITAS and local Swedish projects). A study pilot actions performed gave important information about different kinds of solutions in different cities. By studying pilot actions, there was the possibility of seeing the structures of how urban freight actions are handled within the city, what factors and incentives are important, and what information was missing to integrate freight transport in urban transport planning and create a sustainable urban environment. In this research, pilot actions that are already performed by other researchers or organizations, as well as own involvement in project management of pilot actions, were studied. Data collection for pilot actions mostly contained document analysis (reports of results, statistics, presentations etc.), and interviews of partners in those actions. The result from lack of dissemination of project results and reasons behind different actions or non actions is that the same mistakes are made time after time. Better dissemination of pilot actions performed is therefore needed. This has also been confirmed by e.g. Thompson and Hassall (2005). They have developed a methodology for evaluating urban freight projects, which enables cities to make the best use of funds to allocate to projects to improve the urban freight system. The evaluation method is based on predetermined goals, objectives, and criteria and an analytical hierarchy method was used to weight and rank different approaches to this. The result in their paper is that evaluating those kinds of projects is a complex task, and there is a strong need to incorporate a wide range of stakeholders and public policy interests in order to succeed.

There are several types of actions discussed when considering freight transport in urban areas. It is common to try to find one solution that more or less "solves everything." One of the most successful opportunities is Urban Consolidation Centres (UCCs). In theory, those could contribute to a far better environmental performance of freight transport in urban areas. One study which examined the potential for UCCs (Browne et al., 2007c) shows, as in many other cases, that the evaluation phase is important for finding the possibilities and negative effects of the implemented action. Funding, operational issues, organizational considerations and understanding the UCC concept are other highlighted themes that are important to consider. Other possibilities for actions that could affect the environmental performance of freight transport is low emission zones with restrictions for high emitting vehicles, time restrictions, weight restrictions etc. Both carrots and sticks could be useful to create a situation where all stakeholders and actors are involved to minimize negative environmental impacts.

Browne et al. (2007a) made a comparison between two of the largest cities in Europe, Paris, and London, and their efforts regarding freight transport. Both of those cities have during recent years, started to approach the freight transport issue and have raised the awareness of the emerging environmental issues in relation to heavy transport. They conclude in their paper that it is the political willingness due to engaged Mayors in the cities, together with massive stakeholder cooperation, that have made those efforts successful. The approaches to freight transport are similar in both cities, with voluntary schemes and agreements between the city and the transport operators, but also some restrictions in access times that differ between the cities' approaches. Comparisons between cities of this type made in their paper are useful for comparing different approaches; an effective evaluation followed by dissemination results allows a helpful comparison of the cities' efforts. By this it is possible to use information in other contexts and in more thorough ways. Knowing the differences in cities' possibilities, contexts etc. allows us to know if the same prerequisites are needed to achieve the same type of results.

3.2. The SUTP method and the BUSTRIP project

To handle pilot actions in cities as well as all kinds of actions in the area of transport operations, there is a need for a comprehensive method. Sustainable Urban Transport Plans (SUTP) have been strongly recommended by the European Union as a foundation for a new approach to transport in urban areas (European Commission, 2005). The SUTP preparation and adoption is a process that requires somewhat new ways of thinking when cross departmental cooperation and integration of transport, urban, and economic planning is an important prerequisite. An expert group was put together by the European Commission in the context of preparing the Thematic Strategy on the Urban Environment (European Commission, 2005), with the purpose of giving recommendations on SUTP as well as suggesting procedures, instruments, and measures needed for a SUTP (Wolfram, 2004). The work of the expert group formed the basis for which further work with SUTP has been built.

One project that has addressed the process of preparing and implementing SUTPs in different cities is the EU project called BUSTRIP (Baltic Urban Sustainable Transport Implementation and Planning) conducted between the years 2005 and 2007 (UBC Commission on Environment, 2007). This project contained 11 cities and one region in the countries around the Baltic Sea and has been a major source of information and data for this paper. The main outcome of the BUSTRIP project was a toolbox providing guidelines for the SUTP process. This toolbox is based on the experiences from the project, as well as the developed SUTP concept. The SUTP process, see Figure 1, consists of two parts: the SUT Planning and the SUT Plan. Both parts are equally important. The SUT Plan is the outcome of the SUT Planning process, but it is essential to remember that the implemented plan is an ongoing process. The SUTP is dependent on an everlasting collaboration and communication between departments and stakeholders addressing the challenge of achieving sustainable urban transport. The process addresses all modes of transport (public transport, freight, walking, cycling, private cars etc.) and encompasses the reduced need for transport (reducing urban sprawl etc.).

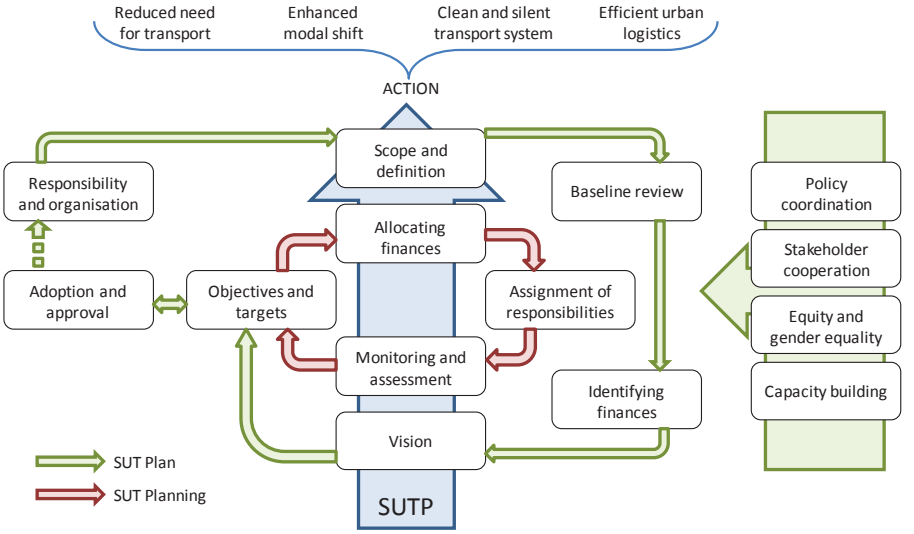

Figure 1 The process cycle of a SUTP (UBC Commission on Environment, 2007)

The BUSTRIP project was built on the basis of communication and sharing of experiences. Each city conducted a self assessment where the own organization and transport situation was critically analyzed. This assessment was followed by a peer review, where groups of experts spent a week in each city for an even more critical audit. Feedback was given and information between cities shared. The goal for each participating city was to implement or improve an existing SUTP. Freight transport is an area that was quite low prioritized in the participating cities. Not much effort was put into this area before the project with a few exceptions. Very few had any interest in developing

this area further since they considered it to be a business problem. Public transport etc. is seen as easier and more important for the city authority to work with.

4. Qualitative Studies – Transport and Freight Reviews by Interviews

In order to understand why freight transport has a minor role in urban areas as well as an understanding of how to overcome this barrier, a case study approach has been used involving five European cities (A, B, C, D and E) in two studies. The cities differ in size as well as in economic and social circumstances. As the study includes both cities from the old and new member states of the European Union, there is a substantial difference in the 'political and administrative culture'. Two of the cities took part in both studies.

In the first study a holistic transport review was performed including all modes of transport within the frame of the BUSTRIP project for three cities (A, B and C). The complete transport aspect gives interesting insights to how freight transport is regarded compared with other transport modes in the urban area. Thirty in-depth interviews were performed during peer reviews of those cities, complemented with information collected during the preceding self assessment. The interviews included a wide range of actors representing different views of the freight transport issue, various levels and functions. The actors interviewed have been: local authority representatives (head of departments, decision makers, politicians and handling officers), hauler and logistics provider companies, trade organizations etc. The interviews were all performed by Maria Lindholm, but with assistance of different other transport experts in the peer review teams of the BUSTRIP project.

The second study included four cities (A, B, D and E) and focused on freight transport in particular. Those cities was also a part of the BUSTRIP project but chosen by the criteria that logistics and freight transport activities play a strong role in their cities and that they were willing to share information and accepted interviews being made with authorities as well as local businesses. Thus around 30 in-depth interviews have been conducted also within this second study with the same range of interviewees as in the first study, but now focusing on freight. The interviews were performed in person by the same two researchers in all four cities (Sönke Behrends and Maria Lindholm) ranging from about one to two hours each.

The interviews in both studies were of a semi structured type and included questions about municipality profile (administration, political issues etc.), drivers (factors that imply actions for sustainability), impacts (indicators for emissions, quality of urban life etc.), problems, plans and policies. The same questions were asked in all cities following an interview guide, to similar stakeholders and actors, in order to get comparative results. But, also additional questions were asked in some interviews and in other cases it was not possible for all actors to answer the questions by themselves. The interviews together with the peer reviews represent a qualitative view of the urban freight transport problems and possibilities for local authorities.

5. A Framework Model

For presenting the case study results, a framework model for SUTP regarding freight transport has been created (Figure 2). The framework model is based on the integrated transport model of Sjöstedt (1996) and has been extended by including firstly, the SUTP concept and its planning principles as integrating element; secondly, the external factors which influence the urban freight transport system; thirdly the unsustainable impacts as outcomes of external factors and urban freight transport planning and measures. The model is systems oriented and it is organized around four basic elements: facilities where the economic activities take place, goods that demand transport to and from these facilities, vehicles that provide transport services and infrastructure. These elements interact in pairs in four different subsystems which are accessibility, land use, transport and traffic. Together, the interaction of the subsystem determines the performance of the transport system. For the purpose of this case study the model has been used to discuss the results from the interviews. The results have therefore been divided into five categories and presented below; planning principles, accessibility, transport, traffic and impacts.

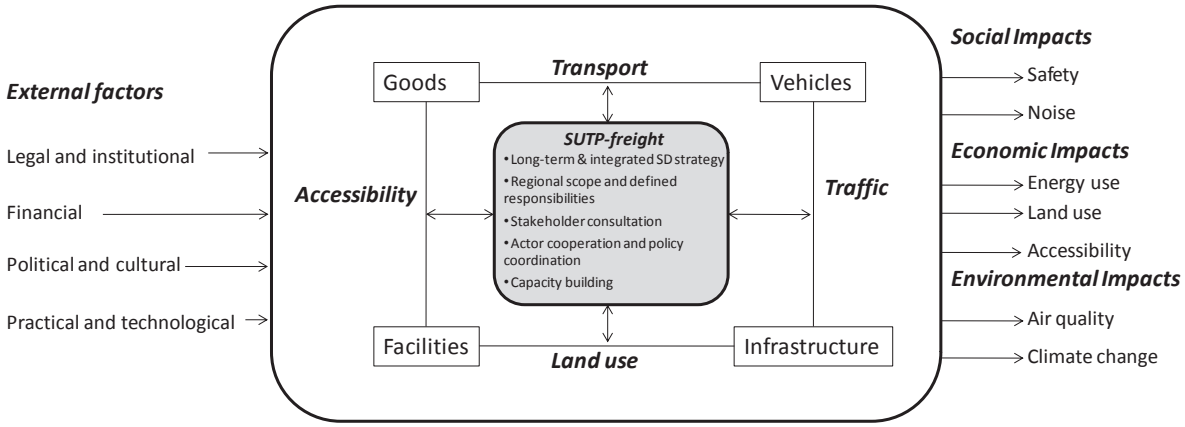

Figure 2 The relationship between factors affecting SUTP-freight (adapted from Sjöstedt, 1996)

5.1. Planning principles

There is a lack of awareness of freight transport issues. Among the New Member States of the European Union (NMS), freight transport movements in the cities are not well understood and not seen as a high priority or a major source of problems. Though it is recognized that it will become a problem in the future, there is no planning department dedicated to freight issues. In the Old Member States of the European Union (OMS), municipalities have good data about freight traffic in urban areas and they see urban freight as a growing threat for local sustainability. However, planning is limited to achieve traffic optimization. More ambitious approaches to actively tackle the problem and steer the development have failed. The bad experiences lead to reluctance to continue working on the issue at a strategic level. A further issue is a lack of cooperation between city departments. Cooperation with private stakeholders, on the other hand, is quite good in all cities according to local authorities, but not as good according to local stakeholders.

5.2. Accessibility

Economic growth will lead to more goods being produced, as well as being consumed in urban areas, especially among cities in the New Member States. Every evaluated city sees itself in a preferable location for logistics activities, and is actively marketing itself as a logistics hub with the goal of establishing more transport and logistics intensive companies. Overall, goods demanding accessibility will continue to increase.

5.3. Transport

Road transport is dominating the modal split for the connection of logistics facilities with their hinterland. There is a demand for rail services which potentially can offer better speed and lower costs, however, infrastructure capacity constraints and operational barriers lead to a lack of rail transport services. The modal split of the hinterland transport of ports in the OMS is around 30% for rail, while in the NMS it is significantly lower.

5.4. Traffic

The growth in traffic flows is a growing problem in the cities interviewed. A lack of traffic infrastructure is a common challenge. An additional common challenge is the lack of loading space in central business districts, which causes problems for delivery operations and hinders traffic flow, pedestrians, and cyclists in central business districts.

5.5. Impacts

In general, there is no clear connection made in any of the cities studied between environmental impacts and freight transport. There is a higher recognition of the problem in the OMS than in the NMS. Emissions have been highlighted in recent years because of the air quality standards from the European Commission (2008), and most cities are trying in different ways to reduce those emissions, but the proportions of freight connected emissions is not known. Congestion is also a growing problem, both due to private cars, but also connected to freight transport. In the NMS, car ownership is increasing. The main action to reduce congestion is new infrastructure, both in OMS and NMS.

6. Quantitative Studies – Freight Review by a Questionnaire Survey

To further develop and confirm the identified lack of knowledge and awareness of urban freight transport issues, a questionnaire survey was performed as a web survey among Swedish municipalities. The final response rate was 32.4%, with a good mixture of respondents considering city sizes.

When addressing freight transport issues in particular, there are few cities that have this as a specific area for an employee. When specifying the work area, the respondents do in general have more time for traffic planning issues than other traffic and transport issues. Freight transport is considered a bit more in larger cities than in the overall average, yet few work more than 20% of their time on the issue. Small cities have little working time with freight. Only one city answered that they have one full time employee dedicated for freight transport. Integration of traffic and transport planning issues between departments, as well as involvement of stakeholders is one important step towards better prerequisites for a sustainable freight transport situation. Integration between freight transport and public transport issues are examples, as well as integration between structural planning, infrastructure planning and transport planning departments. Regarding strategies for transport, today it seems like safety, noise, attractive and compact urban areas, improvements for walking, and cycling and accessibility are important factors in the planning procedures. When regarding the future (around year 2020) respondents' focus is shifting towards emissions (both local and global) and reducing the need for transport. A total of 65% of the respondents consider freight transport to be a problem area within the urban areas. Even though the number is higher (80%) for larger cities, it is as high as 45% in small cities. When asked to specify the problems, it can be noted that noise and safety are by far the most problematic areas. A total of 26% of the respondents do consider that there are major barriers working with freight transport in the city. The main barrier is considered to be economical.

A basic requirement needed to work with freight transport is to be aware of the prerequisites. In this matter, statistics regarding freight transport in the area are important. Only 30% of the cities have any kind of statistics available regarding freight transport (no difference between small and large cities). Finally, it was interesting to note that only 10% of the respondents had any kind of logistics education, even though the questionnaire survey was dedicated to persons working with freight transport. There is a difference between small cities and bigger cities. In Sweden, there are only a handful of cities of the size that need extensive freight transport planning by itself. Smaller cities are part of a region where the transport operators' deal with several cities, and the city does not always have the possibility to affect all movements of goods. But, both small and big cities set the framework for how the movements could take place. The survey performed in this study showed that almost no cities in Sweden handle freight transport extensively.

7. Key Considerations

There are a couple of citations from the interviews in the research process, which concludes quite a lot in this issue:

"We don't know much about freight transport, only that they are in our way transporting passengers" (Person working for an organization responsible for both freight and public transport)

"We never thought of handling freight issues" (Person from a transport planning department)

It has been concluded in many other research projects (e.g. Allen et al. 2007; Browne et al., 2007b; Lindholm and Thalenius, 2006; OECD, 2003; Ottosson, 2005a; Ottosson, 2005b; Zunder and Ibanez, 2004) that there is a problem with freight transport issues in urban areas. Most studies have been based only upon literature review studies and several issues have been found as basis for why freight transport is a low prioritized area. In this research study other methods have been used to investigate the same problem. The research has centred on sustainable urban freight transport from a local authority perspective and a variety of studies have been conducted. The literature confirmed the initial thoughts about the existing problem of freight transport issues receiving low priority in local planning procedures. The complementary studies made of case cities by interviews, as well as the questionnaire survey, also confirms those thoughts with empirical data. Freight transport is not just a problem; it is a necessity for the life of the city. It is not possible to reduce all goods transports, but there is great potential to make them more efficient. The distribution vehicles, heavy goods vehicles and other service vehicles that are moving into, out from, and through the urban area all have a specific task – there is a customer that will receive goods, a customer sending goods, or a service needed to be performed. There are few trips within the urban area conducted "just for fun". Therefore, an underlying reason for the difficulties local authorities have with affecting the outcome of urban freight actions is that the volume of goods to the area will be the same no matter what (it is difficult to change the consumer behaviour of residents and businesses), and the goods must be somehow transported to their final location. If restrictions of different kinds are implemented, transport operators will find other solutions to complete services to their customers. Those actions could be counterproductive; a weight or time restriction could result in more vehicles since the same amount of goods need transporting in less time or with smaller vehicles. This will create more emissions, which might not have been the initial idea. The local authorities need to understand the problem so they may also understand the response to differently implemented restrictions or actions. Single actions might not be enough, but a sequence of multiple actions to grapple a complex problem may be required.

SUTP as a concept, developed in the BUSTRIP project and as a recent strategy for approaching transport issues by the European Commission, is a way of integrating different strategies and policies in the transport area. This approach is mainly a strategic integration approach. To integrate different policies when working with transport planning is according to both the work in the BUSTRIP project (UBC Commission on Environment, 2007) and a paper by May et al. (2003), it is important to efficiently deal with the sustainability issues that are being raised. One problem is that to deal with areas other than transport (land use planning etc.), and integrate planning strategies with the transport area, there is a need to understand the transport area first. As concluded in this research, the freight transport area is often neglected in overall transport planning issues within the urban area. Integration between different strategic areas is, therefore, also important to integrate with policies between different transport areas.

In Figure 3 below, a summary is offered of identified problems for actors in general that have been found during the process. This is a result which has been derived from all research phases: literature studies, interviews, and the questionnaire. The results in the matrix have been categorized according to from what part of the research process it emerged. Many have been confirmed throughout the studies, which validates the results. To present this picture gives an indication that the problem of sustainability in urban freight issues is not an isolated problem that can be solved simply by approaching local authorities – the consignor/consignee, the freight forwarder, the transport operator and the research institutes amongst many others are equally important. Information and knowledge from performed actions should be shared from both "failed" and "successful" actions to reach a sustainable urban transport system with possibilities for long-term improvements. The problems are knowing what to monitor, what indicators to use, and how to perform a good and useful dissemination of all parts of the performed actions. Trying total handling and planning of freight transport in cities. There is a need for the local authorities to be aware of the existing problem, what the priorities for solutions are, and to increase the necessary knowledge. But, there is also a need to involve all stakeholders in the process of reducing the negative impacts from freight transport. Both "bottom-up" and "top-down" approaches are needed, and it is essential to understand that most of the time activities affect more than one stakeholder and could cause effects of unexpected nature. It is important not only to understand what the stakeholders can do for you (and together with you) but what they can do to destroy you. Feedback is vital, and the communication must be equally effective both ways. For example, Anderson et al. (2005) confirms this reasoning and states that a combination of company initiatives and public policies will be necessary in developing a sustainable urban freight transport system. Banister (2008), discussing sustainable mobility, also states that there must be willingness to change and that communication as stakeholder involvement is important.

ASPECTS / FACTORS	SUSTAINABILITY	KNOWLEDGE and AWARENESS	BARRIERS	DRIVERS
LAWS and REGULATION			Hard for local authorities to set own regulations if not supported by national government [1,2]	Emission standards [2] Maximum emissions for urban areas (European legislation) [2]
INFRA-STRUCTURE and LAND USE	• to ensure the accessibility offered by the transport system to all categories of freight transport; [2] • to contribute to the enhancement of the attractiveness and quality of the urban environment, by avoiding accidents, minimizing the use of land and without compromising the mobility of citizens; [2]		Insufficient infrastructure [1] Insufficient knowledge of logistics activities in land use planning [1,2] Focus on passenger transport in planning [1,2]	Lobbying from transport operators and other stakeholders (not necessary with an sustainability perspective though) [2]
FINANCIAL			Lack of funding [1,2]	Financial instruments like EU projects [1,2] Engagement from local businesses [1,2]
POLITICAL and CULTURAL		Insufficient support from politics and general policies [1,2]	Business problem ("the market will solve the problem") [1,2] Focus on passenger transport [1,2] Lack of interest [1] Lack of knowledge [1,2] Lack of stakeholder involvement [1,2]	Obvious needs (e.g. weight restrictions in sensitive areas of old towns) [1,2] An engaged person working with the issue [1,2] Stakeholder cooperation [1,2]
PRACTICAL and TECHNO-LOGICAL		Insufficient personnel resources [1,2] Relatively high awareness of possible activities [1] Insufficient knowledge of *how* to start activities [1]	Lack of known solutions [1,2] Lack of communication [1,2] Lack of dissemination of earlier activities [1,2] Unwanted side effects of activities performed [2]	Best practices that show a good result [1,2] Knowing how to handle problems [1,2]
IMPACTS	• to reduce the air pollution, green house gas emissions, waste and noise to levels without negative impacts on the health of the citizens or nature; [2] • to improve the resource- and energy efficiency and cost effectiveness of the transportation of goods, taking into account the external costs [2]	Low awareness of freight transport impacts [1,2] Lack of statistics [1]	Lack of statistics and facts of impacts [1] Lack of incentives to deal with impacts [1,2]	Need for reduction of emissions [1,2] Need for safety improvements on streets [1,2]

Figure 3 Summary of findings of the studies in the research process

(Results from interview and questionnaire studies [1] as well as literature studies [2] are categorized in the matrix. Numbers in brackets [1,2] indicates the source of the result.)

The knowledge and awareness of freight transport issues in the urban area are in general concluded to be very low. Barriers and drivers are identified to be able to understand what problems that is behind the lack of actions, knowledge and awareness of freight transport in urban areas from a local authority perspective. It is concluded that the barriers are far more relevant and important to highlight, than the drivers.

8. Conclusions

The overall research question formulated in the introduction to this paper has no simple and direct answers others than that freight knowledge does affect the outcome of actions. The lack of awareness and knowledge in freight transport issues generates no, or low, interest in handling those problems in urban areas. This is most probably affecting the sustainability of the freight transport system, since nothing, or almost nothing, is done to reduce the impacts in an efficient way. Although many policies and recommendations from the European Commission (e.g. European Commission, 2005) are emphasizing a better integration of freight transport planning into city planning overall, as well as a highlighting of the importance of the impacts from freight transport in urban areas, there seems to be very little understanding at the local authority level. It is interesting to see that there is such little work done in the area of urban freight transport that has been shown in the surveys. For Swedish cities, there is only 1% that has a full time employee working with freight transport issues, and the persons working with transport planning interviewed during the research process (both the BUSTRIP peer review and the BUSTRIP freight review) shows very little interest in the subject. There are only a few dedicated persons that have a genuine interest in the subject that drives the issue further and by that raising awareness in some few cities.

It will probably be impossible to find "the" perfect solution to freight transport issues in urban areas – how to reach sustainability. It is impossible to say that one single action is the solution everywhere. It is probably truer that *several actions* or a *series of action* can help changing the negative trend of increasing emissions from freight transport. How to find those actions and what to do in order to succeed in the implementation is the issue that need to be raised. The identified factors in Figure 3 can help in order to understand the reasons behind freight transport actions successes or failures. *Cooperation and communication* is essential. Those two factors are the basis for many *decisions, awareness and knowledge* in both local authorities but also with other stakeholders. It is probably true that one single person, or a group of persons, need to be the *driving force* behind the first steps towards sustainable freight transport in urban areas. But, the stakeholder cooperation and involvement of those organizations that are affected somehow by freight transport are needed to be able to continue the process and to understand both sides of the coin. Politicians, management officers and technical planners at local authorities need to be aware of why freight transport actions work as they do today in order to understand how it can be changed. To gain knowledge and increase awareness the cooperation and communication with other parties are of course necessary. The research behind this paper confirms that knowledge and awareness in the sustainable urban freight transport area is low, which generates a low interest in the subject and makes it hard to predict outcomes of certain actions. The *information regarding barriers and drivers* form a good basis for how to tackle the issue, and also offers practical indications for local authorities on what factors should be considered. The implication for local authorities is that the issue of urban freight transport should gain a higher priority on the agenda, and the knowledge within this area should be improved. With the results from this research study, there are great possibilities for developing a strategy for handling urban freight transport issues in general.

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